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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/597,806	08/08/2006	Bernhard Kneer	18239-023US1 10709.5	6572
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EXAMINER				
ASFAW, MESFIN T				
ART UNIT		PAPER NUMBER		
2851				
NOTIFICATION DATE		DELIVERY MODE		
11/14/2008		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

### Office Action Summary

**Application No.**

10/597,806

**Applicant(s)**

KNEER ET AL.

**Examiner**

Mesfin T. Asfaw

**Art Unit**

2851

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 08 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-850)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date 10/12/2007, 09/22/2006, 08/08/2006



### **DETAILED ACTION**

1. Acknowledgment is made of the preliminary Amendment filed on 08/08/2006.
2. Acknowledgement is made of the below "X" references, which were cited in the international search report (PCT/EP2004/014727):
  - a) US 2002/163629 A1 (SWITKES MICHAEL ET AL)
  - b) WO 2004/057589 A (KONINKLIJKE PHILIPS)
  - c) US 2004/125351 A1 (KRAUTSCHIK CHRISTOF GABRIEL)
  - d) WO 2004/107048 A (CARL ZEISS SMT AG).

### ***Claim Objections***

3. Claims 28, 29 and 31 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.
  - a) Claim 28 should be written in a better form to clearly show that it is incorporating all of the limitations in claim 1.
  - b) Claim 29 is also objected for it is dependent upon claim 28.
  - c) Claim 31 should be written in a better form to clearly show that it is incorporating all of the limitations in claim 23.Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claims 1-5, 14, 18-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Van santen [WO 2004057590 A1].

**Regard to claims 1-2, 5, 14, 18-19,** Van santen teaches a projection objective of a microlithographic projection exposure apparatus (fig. 6, Page 10 line 32 – Page 11 line 4) for imaging a mask (reticle 17) that is disposable in an objective plane of the projection objective on a photosensitive layer 5 that is disposable in an image plane 12 of the projection objective, wherein

the projection objective is designed for immersion operation in which an immersion liquid 91 adjoins the photosensitive layer 5 (Page 8 lines 20-26),

the refractive index of the immersion liquid 91 is greater than the refractive index of a medium 9 that adjoins the immersion liquid on the object side (Page 7 lines 4-17), and wherein

the immersion liquid is convexly curved towards the object plane during immersion operation (See fig. 2, Page 8 lines 8-19).

**Regarding Claims 3-4**, Van santen teaches the curved image-side surface is surrounded by a drainage barrier (See fig. 2 (65), Page 13 lines 7-14).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 6, 15-17, 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van santen. The teachings of Van santen have been discussed above.

**Regarding claims 6, 15-17, 20-22**, Van santen teaches the curved image-side surface occupied by the space 53 is ranged preferably to be 3-1500  $\mu\text{m}$  and more preferably 3-500  $\mu\text{m}$  where this value can be changed depending on the viscosity of the liquid to be used as a medium (Page 9 lines 4-16).

Although the curved image side surface of Van santen obviously has a predetermined radius of curvature, Van santen does not explicitly teaches the radius of

curvature to be between 0.9 times and 1.5 times the axial distance between the curved image-side surface and the image plane.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the curvature as claimed by the instant claim because the general condition of the claim and its advantage teaching of a range of size, that is to get a best focus point and resolution of images, was disclosed by Van santen and whether it is between 0.9 times and 1.5 times the axial distance or not, discovering the optimum or workable ranges involves only routine skill in the art.

**Regarding Claims 23-25**, Van santen teaches a projection objective of a microlithographic projection exposure apparatus (fig. 6, Page 10 line 32 – Page 11 line 4) for imaging a mask (reticle 17) on a photosensitive layer 5 (Page 8 lines 20-26) that is disposable in an image plane 12 of the projection objective, wherein the projection objective is designed for immersion operation in which an immersion liquid 91 adjoins the photosensitive layer.

the immersion liquid 91 forms an interface with a medium 59 that adjoins the immersion liquid on the object side of the projection objective, said interface being convexly curved towards the mask (See fig. 2).

Van santen also teaches the curved image-side surface occupied by the space 53 is ranged preferably to be 3-1500  $\mu\text{m}$  and more preferably 3-500  $\mu\text{m}$  where this value can be changed depending on the viscosity of the liquid to be used as a medium.

Van santen does not explicitly teach the maximum radius of curvature equals the product  $m \cdot s$ , wherein  $s$  is the axial distance between the interface and the image plane and  $m$  is a real number between 20 and 120.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the curvature as claimed by the instant claim because the general condition of the claim and its advantage teaching of a range of size was disclosed by Van santen and whether the maximum radius of curvature is between 20 and 120 or any other range of distance, so long as to provide an optimum focus to the substrate image formation, discovering the optimum or workable ranges involves only routine skill in the art.

8. Claims 26-27 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van santen in view of Omura et al. [US 20050248856 A1, hereinafter referred as Omura]. The teachings of Van santen have been discussed above.

**Regarding Claim 26-27 and 32,** Van santen teaches the projection objective.

Van santen does not specifically teach the projection objective is a catadioptric objective that has at least two imaging mirrors and in which at least two intermediate images are formed.

Omura teaches the projection objective is a catadioptric objective that has at least two imaging mirrors and in which at least two intermediate images are formed (Para 16).



Thus, it would have been obvious, to one of ordinary skill in the art, at time the invention was made, to arrive at the projection objective with a catadioptric objective that has at least two imaging mirrors and in which at least two intermediate images are formed for the purpose of small-field system (Para 16).

**Regarding Claim 30**, Van santen teaches the projection objective. Ban santen does not specifically teach the optical elements in the projection objective are made of quartz glass material.

Omura teaches the optical elements in the projection objective are made of quartz glass material.

Thus, it would have been obvious, to one of ordinary skill in the art, at time the invention was made, to arrive at the optical elements in the projection objective that is made of quartz glass material because the refractive index of quartz make it preferable for its use in the wave length range of the exposure apparatus (Para 156).

9. Claims 6, 15-17, 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Van santen in view of Omura and in further view of Coon et al., (hereinafter referred as Coon) US 20070268468 A1. The teachings of Van santen have been discussed above.

**Regarding claims 7-13**, Van santen teaches an immersion liquid medium between the last optical element and the substrate which forms a curved interface with the last optical element of the projection.

Van santen does not specifically teach an intermediate liquid which is not miscible with the immersion liquid which is formed between the last optical element and the immersion fluid.

Omura teaches two separate space between the last optical element Lb and W, separated by an element Lp and they are not miscible (Para 163).

Thus, it would have been obvious, to one of ordinary skill in the art, at time the invention was made, to arrive at an intermediate liquid of a different refractive index and characteristics, which is not miscible with immersion liquid, in order to get a better focus and a greater image resolution.

Van santen in view of Omura teaches an intermediate liquid, which is not miscible with the immersion liquid and which forms a curved interface with the last optical element of the projection lens.

Van santen in view of Omura does not teach an intermediate liquid, which is not miscible with the immersion liquid and which forms a curved interface in an electric field.

Coon teaches an immersion liquid in an electric field (See fig. 7-8).

Thus, it would have been obvious, to one of ordinary skill in the art, at time the invention was made, to arrive at an intermediate liquid, which is not miscible with the immersion liquid and which forms a curved interface in an electric field in order to get a very high viscosity to control the flow of the liquid (See fig. 7-8, Para 38-39).

**Regarding Claims 28, 29, 31**, the claims are directed to a device manufactured by a method of claims 1 and 23. However, it is conceivable that the device can be made by another method other than the method of claim 1 or claim 23. The patentability of a

device/product does not depend on its method of production. The claim is unpatentable even though the prior art product was made by a different process/method.

### **Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mesfin T. Asfaw whose telephone number is 571-270-5247. The examiner can normally be reached on Monday to Friday, 7:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diane Lee can be reached on 571-272-2399. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mesfin T Asfaw/  
Examiner, Art Unit 2851

/Diane I Lee/  
Supervisory Patent Examiner, Art Unit 2851

